MECHANICS.

When this issue was made up solutions had been received for numbers 292, 293, 295–6–7–8–9. Please give attention to 272, 277–8–9, 286–7, 290–1, 294, 300.

301. Proposed by CLIFFORD N. MILLS, Brookings, S. D.

A wire is hanging from two points in the same horizontal plane. If the difference between the length of the wire and the actual distance between the supports is very small, show that

$$s = x\left(1 + \frac{x^2}{6c^2}\right),$$

where s is one half the length of the wire, c is the horizontal tension at the lowest point divided by w the load pei unit of horizontal distance, and x is the distance of lowest point of the curve to the point of support.

NUMBER THEORY.

When this issue was made up solutions had been received for numbers 212–13, 215–16, 218, 220, 223. Please give attention to 191–2, 196, 198, 201–2, 205, 208–9–10–11, 214, 217, 219, 221–2.

224. Proposed by PATRICK WALSH, New Orleans, Louisiana.

Find the sides, in rational numbers, of a right angled triangle whose area is $5\frac{1}{2}$.

225. Proposed by W. DE W. CAIRNS, Oberlin College.

L'Intermédiaire for June, 1914, contains the following problem:

"If we write the terms of the arithmetic series 1, 5, 9, 13, 17, 21, 25, 29, 33, $\cdots$ as follows:

$$\begin{array}{ccccccc} 1 \\ 5 & 9 & 13 \\ 17 & 21 & 25 & 29 & 33 \\ 37 & 41 & 45 & 49 & 53 & 57 & 61 \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot, \end{array}$$

it is seen that the sum of the terms of each line is a cube, and that these are the cubes of the successive "odd integers. How is this shown?"

It is here proposed not only to prove this, but to generalize the theorem as suggested, using, however, the simpler (and better known) case which includes all of the successive integers:

$$\begin{array}{cccc} 1 \\ 3 & 5 \\ 7 & 9 & 11 \\ 13 & 15 & 17 & 19 \\ \cdot & \cdot & \cdot & \cdot \end{array}$$

SOLUTIONS OF PROBLEMS.

ALGEBRA.

412. Proposed by H. L. SLOBIN, University of Minnesota.

Form the algebraic equation whose roots are:

$$a_1 = \cos\frac{\pi}{9}, \qquad a_2 = -\cos\frac{2\pi}{9}, \qquad a_3 = -\cos\frac{4\pi}{9}.$$

SOLUTION BY CLIFFORD N. MILLS, Brookings, South Dakota.

From the suggestions given by the proposer,

$$\cos r\pi = \frac{(-1)^r + (-1)^{-r}}{2}.$$